Correlates of longitudinal patterns of racial discrimination in midlife and older Black adults: Evidence from the health and retirement study

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ABSTRACT

Objective: Single cross-sectional discrimination measures may mask dynamic patterns of cumulative experiences and exposure to racial discrimination. However, there is a dearth of studies assessing trajectories of racial discrimination, particularly among midlife and older Black adults in the United States. The study aims to identify trajectories of racial discrimination over 12 years. We also examine the association between sociodemographic characteristics and resilience resources with racial discrimination trajectories.

Methods: Using data from the Health and Retirement Study (2006–2020), repeated measures latent profile analysis was employed to identify racial discrimination trajectories among Blacks aged 50+ (N = 1710). Multinomial logistic regression examined the association between sociodemographic and resilience resources with racial discrimination trajectories.

Results: Three racial discrimination trajectories were identified: low-stable (70 %), moderate (23 %), and persistently high and increasing (7 %). Individuals reporting higher levels of major lifetime experiences of discrimination and greater neighborhood social cohesion were associated with membership in the "moderate" and the "persistently high and increasing" racial discrimination trajectory groups. Those reporting positive social support and psychological resilience were less likely to be in the "moderate" or the "persistently high and increasing trajectory" groups.

Conclusions: These findings suggest heterogeneity in the cumulative patterning of racial discrimination among midlife and older Black adults. Racial discrimination trajectories may enable greater precision in estimating the health consequences of cumulative exposure to discrimination. Future studies are warranted to determine whether membership in specific discrimination trajectory groups confers differential risk to age-related conditions.

1. Introduction

Racial discrimination is a chronic psychosocial stressor associated with adverse mental and physical health outcomes, premature aging, and earlier mortality among midlife and older adults (Ayalon and Gum, 2011; Barnes et al., 2008; Everson-Rose et al., 2015; Tené T. Lewis, Aiello, Leurgans, Kelly and Barnes, 2010; Rogers et al., 2015; Sutin et al., 2015; Williams and Mohammed, 2009). Hypothesized mechanisms linking racial discrimination to worse health outcomes include heightened physiological, psychological, and behavioral (i.e. maladaptive coping) responses (Clark et al., 1999; Harrell et al., 2003; Munoz et al., 2015). The chronic, prolonged activation of these pathways is hypothesized to accumulate across the life-course and have a long-term impact on aging processes (e.g., hasten the progression of disease and memory impairment) (Glymour and Manly, 2008; Sapolsky et al., 1990). Yet, much of what is known about the effect of racial discrimination on

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health among midlife and older Black adults is from empirical studies largely measuring racial discrimination at one, static point in time to predict health at a subsequent point in time. While these studies have been critical to further our understanding of how racialized psychosocial stress affects health, measuring racial discrimination at a single time point only provides a snapshot of one's lived experience. A cross-sectional assessment of exposure to racial discrimination may be insufficient for several reasons. It may not adequately account for the dynamic and cumulative nature of racial discrimination over time (Thrasher et al., 2012), which overlooks the fact that exposure to racial discrimination is often repeated and can vary in frequency and intensity. Also measuring racial discrimination at one specific time point assumes that the snapshot is an adequate representation of an individual's exposure to racial discrimination over time (Lennon et al., 2018). This assumption may underestimate and potentially limit the accuracy of conclusions drawn about the relationship between racial discrimination and health.

Several studies have highlighted significant within-group variability in aging processes and outcomes among Black midlife and older adults (Brown et al., 2021; Cobb et al., 2023). However, the sources of this variability remain poorly understood. Some scholars suggest that variations in the lived experiences of discrimination may help explain these differences. Emerging research suggests that midlife and older Black adults experience different patterns of racial discrimination that can fluctuate and influence health behaviors and health outcomes (Brown et al., 2021; Cobb et al., 2023; White et al., 2020). Investigating the heterogeneity in the longitudinal exposure to racial discrimination could provide valuable insights into the aging process and aging-related health outcomes – an area that has received insufficient attention in previous studies (Becares and Zhang, 2018).

Drawing from life course, cumulative inequality, and stress accumulation theories(Bowleg, 2012; Crenshaw, 1989; Ferraro and Shippee, 2009), several prior studies have characterized and identified racial discrimination trajectory profiles. The racial discrimination trajectories are indicative of distinct longitudinal patterns of stability (e.g., increasing, decreasing, fluctuating, or steady) and frequency (e.g., low, medium, and high) in exposure to racial discrimination over time. This body of research suggests there is heterogeneity in the cumulative patterning of the lived experience of racial discrimination. However, much of this research is concentrated among adolescents and emerging adults(Greene et al., 2006; Lee et al., 2018; Niwa et al., 2014; Smith-Bynum et al., 2014). For example, Lee et al. (2018) showed that the racial discrimination trajectories among African American young adults could be classified as "high/stable", "low/rising", and "low/-declining"(Lee et al., 2018). Only a few studies have characterized racial discrimination trajectories among a sample of midlife and older adults (Becares and Zhang, 2018; White et al., 2020). Becares and Zhang (2018) identified four perceived interpersonal discrimination trajectory groups in a sample of African American, Chinese American, Hispanic, Japanese American, and White women aged 42–52, from 7 cities across the United States. The trajectory groups characterized the cumulative exposure to discrimination according to discrimination attributes and domains and were not specific to African Americans(Becares and Zhang, 2018). Using a nationally representative sample of Black adults aged 50 and older residing in the United States, White et al. (2020) identified general discrimination (low, moderate, and persistently high) and racial discrimination (low-moderate and persistently high) trajectories (White et al., 2020). These studies have been instrumental in advancing evidence-based conceptualizations of the lived experience of racial discrimination, portraying it as a dynamic process that accounts for within-group variations in how racial discrimination is experienced. However, there remains limited understanding of the resilience resources and characteristics associated with racial discrimination trajectory profiles, that can supplement our understanding of the aging experiences of midlife and older Black adults.

Resilience resources are key protective assets that can be drawn upon to promote health and well-being to overcome adversity (McDonough et al., 2023; Steiner et al., 2023). Extending research on characterizing and examining racial discrimination trajectory profiles to additionally investigate resilience resources may help mitigate the adverse impact of racial discrimination on aging, health, and well-being. Recent research demonstrates that midlife and older Black adults employ various resilience resources at the individual- (e.g., religion, avoidance), social- (e.g., availability, size, and diversity of support from family, friends, and groups), and neighborhood- (e.g., social cohesion) levels to facilitate coping with racism (Jacob et al., 2023; McDonough et al., 2023). While studies exploring the relationship between resilience and racial discrimination have been conducted, examining resilience resources in relation to membership in specific racial discrimination trajectories has not been investigated.

More empirical studies are needed to improve our understanding of midlife and older Black adults' experiences of racial discrimination and their resilience resources to guide future research on healthy aging. Leveraging the longitudinal design of the Health and Retirement Study that has repeated measures of racial discrimination, the purpose of this study is to identify trajectories of racial discrimination, using the Everyday Discrimination Scale in a population-based sample of midlife and older Black adults over 12 years. This study also identifies whether individual- and neighborhood-level resilience resources are associated with racial discrimination trajectory membership which addresses a key under-researched area in the racial discrimination evidence base. Characterizing racial discrimination trajectories and their predictors may have implications for greater precision in differentially stratifying and estimating risk due to racial discrimination in the aging process.

2. Methods

2.1. Data and sample

The Health and Retirement Study (HRS) is a longitudinal biennial-interview survey of a nationally representative sample of non-institutionalized U.S. adults aged $\geq$50 years and their partners of any age. Detailed descriptions of sampling procedures and study design are available elsewhere (Heeringa and Connor, 1995). Briefly, HRS was initiated in 1992 and employs a multistate area probability design with geographic stratification and clustering. The HRS sample includes multiple birth cohorts, with varying times of entry in the study. Additionally, HRS also utilizes a steady-state design where the sample is replenished every 6 years with a younger cohort (Sonnega et al., 2014). The original response rate was 81.4 % and response rates for subsequent waves range between 85 and 90 % (Sonnega et al., 2014). Blacks and Hispanics are oversampled with response rates and longitudinal follow-up comparable to or better than Whites (Ofstedal and Weir, 2011). Participants are interviewed biennially in several domains including health, psychosocial factors, health care expenditures, and service utilization. The RAND Corporation's publicly available data, a user-friendly version of the longitudinal data, was utilized because of the consistent measures of Core data variables over the survey period (Bugliari et al., 2016). The Leave-Behind Questionnaire (LBQ), which began in 2006 captures information in the following substantive areas: subjective well-being; lifestyle and experience of stress; quality of social ties; personality traits; work-related beliefs; and self-related belief (Smith et al., 2017). It is completed by a rotating random half sample of HRS participants who completed the in-person interview during that wave. Thus, participants complete the LBQ every 4 years, with the two subsamples alternating years (see Supplemental Fig. 1) (Smith et al., 2017). LBQ response rates range from 72.7 % to 87.7 % (Smith et al., 2017).

We utilized HRS data collected between 2006 and 2020 (a total of eight waves). The analysis is restricted to respondents who self-identify as non-Hispanic Black and aged 50+ at baseline (N = 7923). Of the eligible HRS respondents, we excluded individuals who were completely

missing data on the Everyday Discrimination Scale and those with ≥3 missing waves of data on discrimination, and those who attributed all their discriminatory experiences to non-racial reasons. This yielded a final analytic sample of 1710 respondents (see Supplemental Fig. 2). Compared to the final sample, those who were excluded from the study were slightly older, more likely to be male, have lower educational attainment, and more likely to be foreign-born (see Supplemental Table 1). In the original data collection, all participants provided informed consent, and the HRS study was approved by the University of Michigan Institutional Review Board. The secondary data analysis was deemed as exempt human subjects research.

2.2. Measures

Racial discrimination was measured using the Everyday Discrimination Scale (EDS), that was designed to capture chronic forms of mistreatment across several domains (Williams et al., 1997). The EDS has been shown to exhibit high internal consistency and validity (Krieger et al., 2005; T. R. Taylor et al., 2004). Participants were asked how often they experienced: treatment with less courtesy or respect than other people; received poorer service than other people at restaurants or stores; people act as if they think you are not smart; people act as if they are afraid of you; and you are threatened or harassed. We excluded the item on medical discrimination that was added in later waves and not measured in all the study waves. Responses were scored on a 6-point scale (1 = almost every day, 6 = never). Consistent with prior research, items were reverse-coded and rescaled to zero such that the scale ranged from zero to five(Cobb et al., 2023). A continuous EDS score was created by summing the scores across the items. Respondents reporting any frequency of discrimination were asked a follow-up question about attribution (e.g., ancestry or national origin; gender; race, age, religion; weight, physical disability, other aspect of physical appearance, sexual orientation, financial status, or other). A measure of racial discrimination was created based on responses to unfair treatment attributed to race, ancestry, or national origin. Additionally, respondents who marked that they were subjected to racial discrimination but did not identify how frequent or in which settings were assigned a score of 0.5. In this analysis, racial discrimination scores ranged from 0 to 30, with higher scores corresponding with more frequent experiences of racial discrimination.

The predictors (e.g., sociodemographic, economic, major lifetime discrimination, and resilience resources) of racial discrimination trajectories were measured as baseline. Sociodemographic variables included age (50–64, 65–79, >79), gender (male, female), foreign-born status (US-born, foreign-born), birth in the US South (south, not south), and marital status (never married, married/partnered, divorced/separated/widowed). Economic indicators included educational attainment (less than high school [HS], HS or equivalent, some college, college graduate or more), and household wealth (total assets – total liabilities). The six-item major lifetime discrimination scale and its individual items were assessed (Williams et al., 1997). Respondents indicated whether at any point in life: unfairly dismissed from a job; ever not hired for unfair reasons; unfairly denied a promotion; unfairly prevented from moving into a neighborhood; unfairly denied a bank loan; and unfairly treated or abused by police. A count of major lifetime discrimination experiences was constructed by summing the number of affirmative responses.

Resilience resources included psychological resilience, positive social support, social participation, and neighborhood social cohesion. Psychological resilience was derived by summing 12 items from the Wagnild and Young Resilience Scale which captures adjustment and management of adversity and assesses domains such as equanimity, meaningfulness, and self-reliance (G. M. Wagnild and Young, 1993). The scale exhibits strong psychometric properties (Cronbach's α = 0.85) (M. G. Taylor et al., 2019; Gail M. Wagnild and Collins, 2009; G. M. Wagnild and Young, 1993). Social support from spouses, child or children, other family (e.g., brother, sisters, grandchildren, parents, cousins), and

friends was measured separately using 3 items ("do they understand how you feel about things"; "rely on them if you have a serious problem"; and "talk about your worries"). Responses to the three items, ranging from 1 = not at all to 4 = a lot, were summed across each relationship category and an index of positive social support was created by averaging the scores. These items were derived from a widely used social network scale that was previously validated (Lubben, 1988). The positive social support index ranged from 1 to 4, where higher scores reflected higher positive social support. Social participation was assessed using 8 items capturing involvement in various social activities (e.g., caregiving, volunteering, club activities leisure activities, playing games, and physical activity), and summed to create a score, where higher scores represented greater social participation. Neighborhood social cohesion was constructed using 4 items: 1) "I really feel part of this area," 2) "If you were in trouble, there are lots of people in this area who would help you," 3) "Most people in this area can be trusted," 4) "Most people in this area are friendly." Responses were coded using a 7-point Likert scale (1 = strong disagreement; 7 = strong agreement) and summed to calculate average scores (Cronbach's α = 0.86). Similar to prior studies, negatively worded items were reverse-coded, so that higher scores reflected higher levels of cohesion (Kim et al., 2020).

2.3. Statistical analyses

Trajectories of racial discrimination were estimated using repeated measures latent profile analyses (RMLPA) using Mplus 7 software (Muthén and Muthén, 2015). To establish the optimal number of latent classes, we considered the following model fit criteria: Akaike information criteria (AIC)(Akaike, 1973), Bayesian information criterion (BIC) and the sample-size adjusted BIC(Schwarz, 1978), the Entropy Index(Muthen, 2003), and the Lo-Mendell-Rubin adjusted LRT (Lo et al., 2001), which examined and compared the improvement in model fit between the n versus n-1 trajectory models. Once the best-fitting model was determined, using the standard evaluation criteria, we also examined the resulting models to ensure that the results made conceptual sense and that each trajectory contained at least 5 % of the sample (Celeux and Soromenho, 1996). After selecting the number of latent trajectories, posterior probabilities were used to classify participants into racial discrimination trajectories.

After determining trajectory group membership, bivariate analyses, stratified by racial discrimination trajectory groups, were performed to examine differences in sample characteristics across the trajectories using Chi-square tests. Multinomial logistic regression models were estimated to examine the association between sociodemographic, economic, and resilience resources and the probability of belonging to the racial discrimination trajectories while controlling for age and sex. Bivariate and multivariate analyses were conducted using Stata 16.1 (Stata Corp, College Station, TX).

3. Results

A three-group trajectory model was identified as the most parsimonious and best-fitting model of racial discrimination trajectories in the RMLPA (Fig. 1). Trajectory 1, "low-stable", was characterized by individuals who consistently reported infrequent and relatively low levels of experiencing racial discrimination across the study period and represented the greatest proportion of the sample (69.9 %; n = 1196). Trajectory 2, "moderate", reflected individuals who report steady and moderate levels of frequency and across a broader range of racial discrimination during the study period (23.3 %; n = 398). Trajectory 3, "persistently high and increasing", comprised of individuals who consistently reported elevated and increasing average EDS scores across the study period (6.8 %; n = 116). Further details and results from the model selection process are provided (Table 1).

Table 2 describes the characteristics of the study sample by trajectory profile. The racial discrimination trajectories differed significantly by
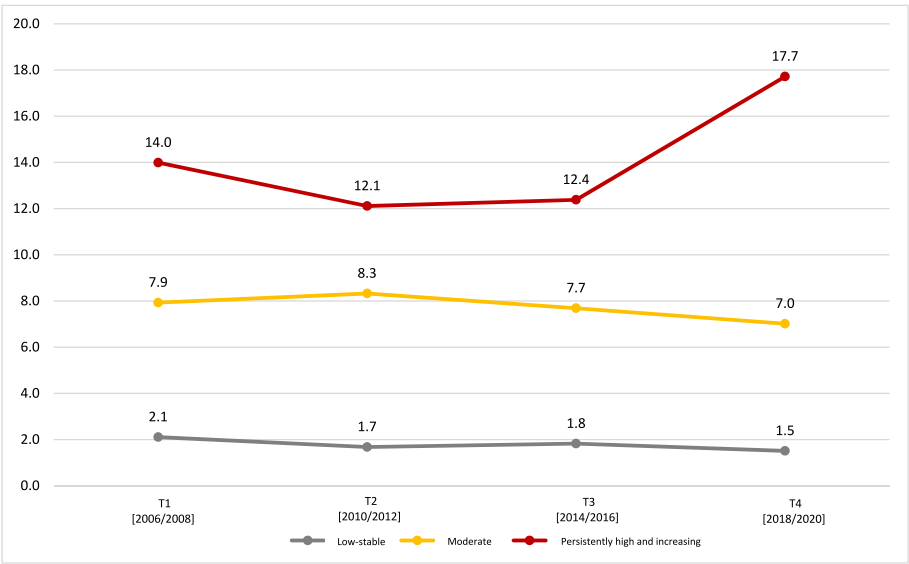
Fig. 1. Three racial discrimination trajectories.
Note: The figure shows racial discrimination trajectories among midlife and older Black (age 50+) adults from the Health and Retirement Study from 2006 to 2020, (N = 1710).

Table 1
Goodness-of-fit indices for racial discrimination trajectories identified in repeated measures latent profile analyses.

Model (Number of Trajectories)	AIC	BIC	SSABIC	LMR-LRT (p)	Entropy	Log-likelihood
1	26267.590	26311.163	26285.747	–	–	–
2	24948.884	25019.690	24978.391	0.0000	0.856	−12461.442
3	24628.390	24726.429	24669.245	0.0123	0.831	−12296.195
4	24381.753	24507.024	24433.956	0.2879	0.843	−12167.876

Note: SSABIC = sample size adjusted BIC; LMR-LRT = Vuong-Lo-Mendal-Rubin Likelihood Ratio Test comparing current model with a model with one less latent profile.

select sociodemographic characteristics, experience of major lifetime discrimination, and resilience resources. The persistently high and increasing group had the highest proportion of individuals aged 50–64, non-south region of birth, higher major lifetime experiences, and greater neighborhood social cohesion. In contrast, the low-stable group had the highest mean scores of psychological resilience.

Results from the multinomial logistic regression are presented in Table 3. After adjusting for age and gender, college education or more was less likely (OR: 0.52; 95 % CI: 0.30, 0.91) to be associated with the "persistently high and increasing" trajectory group versus the "low-stable" group. Individuals who reported higher levels of major lifetime discriminatory experiences and greater levels of neighborhood social cohesion were associated with both the "moderate" and the "persistently high and increasing" trajectory groups with markedly higher associations for the "persistently high and increasing" group. Several individual domains of major lifetime discrimination (e.g., ever not hired for unfair reasons, unfairly denied a bank loan, and unfairly treated or abused by police) had a higher magnitude of association with membership in the persistently high and increasing trajectory group. Unfairly dismissed from jobs and unfairly denied promotion was only associated with the moderate trajectory group in comparison to the low-stable trajectory group. Lower psychological resilience and positive social support were associated with membership in both the moderate and the persistently high and increasing trajectory groups.

4. Discussion

This study identified three distinct racial discrimination trajectories ("low-stable", "moderate", and "persistently high and increasing") to characterize the cumulative racial discrimination experiences among a

sample of midlife and older Black adults over 12 years. Classification in the "low-stable" racial discrimination trajectory was more common than the "moderate" and "persistently high and increasing" trajectory groups. Distinguishing characteristics of the "persistently high and increasing" trajectory group included lower educational attainment, higher reports of major lifetime discrimination and neighborhood social cohesion, and lower levels of positive social support and psychological resilience.

The largest proportion of the sample (69.6 %) belonged to the "low-stable" group which represents individuals who report racial discrimination at relatively low levels across the 12-year study period. While individuals classified in this group are not completely free from experiencing racial discrimination, their experiences tend to be less frequent and occur across fewer domains. This pattern aligns with findings from prior studies examining racial discrimination trajectories, where the majority of participants fell into low stable groups (Lee et al., 2018; White et al., 2020). In contrast, individuals in the "moderate" trajectory group reported more frequent experiences of racial discrimination, though these experiences tend to be more episodic. While individuals in this group report moderate levels of racial discrimination, these experiences occur more frequently and across a broader range of domains than those in the "low-stable" group, though they do not reach the high and chronic levels as seen in the "persistently high and increasing" group. The smallest proportion of our sample was in the "persistently high and increasing" group, which is distinguished by repeatedly high, chronic, and greater encounters of racial discrimination affecting nearly all domains. Individuals in this group reported the highest average scores of EDS over the study period. Notably, this group was the only group to experience an uptick in average EDS scores during the 2018/2020, T4 period, suggesting that this group may have been more adversely affected by external factors during that time (e.g., heightened

Table 2
Baseline characteristics of Black midlife and older adults by racial discrimination trajectories, Health and Retirement Study (HRS), 2006–2020.

	Racial Discrimination Trajectories n = 1710			
	Low-stable	Moderate	Persistently high and increasing	p-value
	n = 1196	n = 398	n = 116	
	%	%	%	
Age				<0.001
50-64	30.6	46.0	54.3	
65-79	52.0	43.2	37.9	
≥80	17.4	10.8	7.8	
Sex				<0.001
Male	32.2	41.0	44.8	
Female	67.8	59.1	55.2	
Education				0.106
< HS	21.4	16.6	22.4	
HS grad or GED	31.4	32.2	34.5	
Some college	29.1	28.5	31.0	
College or more	18.1	22.7	12.1	
Marital status				0.020
Never Married	8.3	11.8	14.8	
Married/Partnered	45.7	45.5	34.8	
Divorced/Separated/Widowed	46.0	42.7	50.4	
Household wealth (mean, SD)	17.3 (34.3)	18.0 (52.0)	12.8 (35.3)	0.433
Foreign-born				0.705
No	94.1	93.7	92.2	
Yes	5.9	6.3	7.8	
Region of birth				0.015
South	67.6	65.3	54.3	
Non-South	32.4	34.7	45.7	
Major lifetime discrimination (mean, SD)	0.7 (1.0)	1.3 (1.5)	1.7 (1.8)	<0.001
Unfairly dismissed from job	14.9	22.9	25.0	0.014
Ever not hired for unfair reasons	11.7	22.3	32.5	<0.001
Unfairly denied promotion	15.5	27.1	30.0	<0.001
Unfairly prevented moving into neighborhood	7.7	12.2	25.0	<0.001
Unfairly denied a bank loan	10.2	18.6	30.0	<0.001
Unfairly treated/abused by police	9.6	23.9	30.0	<0.001
Neighborhood resilience resource				
Social cohesion (mean, SD)	2.8 (1.5)	3.5 (1.4)	3.6 (1.5)	<0.001
Individual resilience resources				
Positive social support (mean, SD)	3.2 (0.5)	3.1 (0.5)	2.9 (0.5)	<0.001
Social participation (mean, SD)	3.9 (4.3)	4.6 (4.5)	4.7 (5.3)	0.009
Psychological resilience (mean, SD)	9.3 (1.8)	8.7 (1.9)	8.0 (1.6)	<0.001

Note: HS = High School; GED = General Equivalence Degree; SD = Standard Deviation.

Table 3
Results of multinomial logistic regression models[a] assessing the relationship between participant baseline characteristics and racial discrimination trajectory.

	Moderate versus Low-Stable			Persistently High and Increasing versus Low-Stable		
	OR	(95 % CI)	P-value	OR	(95 % CI)	P-value
Education						
< HS	ref			ref		
HS grad or GED	1.23	(0.89, 1.71)	0.211	0.93	(0.56, 1.54)	0.763
Some college	1.09	(0.75, 1.59)	0.653	0.80	(0.43, 1.47)	0.463
College or more	1.44	(0.97, 2.14)	0.067	0.52	(0.30, 0.91)	0.022
Marital status						
Never Married	ref			ref		
Married/Partnered	0.71	(0.48, 1.04)	0.077	0.43	(0.24, 0.77)	0.005
Divorced/Separated/Widowed	0.83	(0.56, 1.25)	0.371	0.90	(0.51, 1.59)	0.711
Household wealth	1.00	(1.00, 1.00)	0.783	1.00	(0.98, 1.01)	0.394
Foreign-born						
No	ref			ref		
Yes	0.96	(0.47, 1.95)	0.912	1.14	(0.59, 2.20)	0.698
Region of birth						
South	ref			ref		
Non-South	0.92	(0.67, 1.26)	0.581	1.35	(0.95, 1.92)	0.088
Major lifetime discrimination	1.40	(1.23, 1.59)	<0.001	1.72	(1.36, 2.17)	<0.001
Unfairly dismissed from job	1.55	(1.04, 2.33)	0.033	1.81	(0.90, 3.66)	0.094
Ever not hired for unfair reasons	1.99	(1.43, 2.76)	<0.001	3.70	(1.91, 7.18)	<0.001
Unfairly denied promotion	1.91	(1.29, 2.82)	0.002	2.25	(0.90, 5.67)	0.083
Unfairly prevented moving into neighborhood	1.66	(0.98, 2.81)	0.060	3.89	(2.07, 7.32)	<0.001
Unfairly denied a bank loan	1.90	(1.27, 2.84)	0.002	3.73	(1.92, 7.22)	<0.001
Unfairly treated/abused by police	2.86	(1.73, 4.74)	<0.001	4.23	(1.82, 9.79)	0.001
Neighborhood resilience resources						
Social cohesion (mean, SD)	1.31	(1.18, 1.44)	<0.001	1.41	(1.13, 1.75)	0.003
Individual resilience resources						
Positive social support	0.59	(0.37, 0.93)	0.025	0.34	(0.19, 0.62)	0.001
Social participation	1.03	(1.00, 1.06)	0.075	1.03	(0.99, 1.07)	0.199
Psychological resilience	0.80	(0.73, 0.87)	<0.001	0.66	(0.62, 0.72)	<0.001

[a] Models adjusted for age and gender. Low-stable racial discrimination trajectory group is the reference group.

racial tensions and the COVID-19 pandemic). Although a smaller proportion of our study sample was included in the more adverse trajectory groups, this does not diminish, but rather underscores the significance of the findings – the cumulative patterning of racial discrimination is not uniformly experienced (McClendon et al., 2021).

Our findings are consistent with prior studies showing heterogeneity in the lived experiences of Black individuals exposed to racial discrimination cross-sectionally and longitudinally (Becares and Zhang, 2018; Forde et al., 2020; Greene et al., 2006; Lee et al., 2018; Niwa et al., 2014; Smith-Bynum et al., 2014; White et al., 2020). These results add to a nascent body of work that differentiates midlife and older Black Americans into separate groups of racial discrimination trajectories. This distinction in racial discrimination trajectory profiles provides a more nuanced perspective of within-group heterogeneity in experiences of racial discrimination. In one prior study that used the HRS to identify racial discrimination trajectories, only two racial discrimination trajectory groups (low-moderate and persistently high) were categorized (White et al., 2020). Comparatively, the present study offers a greater distinction between low-stable and moderate, while the prior study collapses these two groups. Moreover, although both studies used the HRS, differences in the number of trajectory groups may be a function of the indicators of model fit indices (e.g., Akaike Information Criteria

[AIC], Bayesian Information Criterion [BIC], and the Vuong-Lo-Mendell-Rubin [VLMR] test) used to estimate and decide upon the optimal model. For the present study, we additionally used entropy and posterior probability indices to augment the degree of separation between the racial discrimination trajectory groups. The reported differences between the two studies may simply reflect differences in modelling assumptions (e.g., model structure and trajectory property). Taken together, both studies highlight the variability in the cumulative patterning of racial discrimination over time experienced by midlife and older Black adults. Prior research has lagged in conceptualizing experiences of discrimination as homogenous in contrast to highlighting the heterogeneity and range of experiences of racial discrimination. This more refined conceptualization, which several scholars have noted is essential for centering the heterogeneity of Black experiences and furthering a more comprehensive understanding of the Black lived experience and its impact on health (Manning et al., 2023; Volpe et al., 2022). Although there are limited existing population-based datasets that provide repeated measurements of racial discrimination among midlife and older Black adults, more empirical work is needed to advance understanding of the cumulative exposure to various forms of interpersonal and structural forms of racial discrimination.

We observed that individuals with higher levels of education were less likely to be in the "persistently high and increasing" racial discrimination trajectory group in comparison to the "low-stable" group. One possible explanation for this finding is that individuals with a college degree or higher may have greater access to protective resources (e. g., community-based resources, institutional or legal protections, or supportive social networks) and may be more likely to employ coping strategies to navigate or reframe discriminatory experiences (Berwise and Mena, 2020). This finding contrasts with prior research suggesting that highly educated Black adults report more frequent experiences of racial discrimination compared to their less educated counterparts, which is likely due to increased visibility in professional and social settings, which may expose them to more discriminatory encounters (Assari, 2020; T. T. Lewis and Van Dyke, 2018; Mouzon et al., 2019; Thomas, 2015). Although there are fewer studies documenting an association between higher educational attainment and less reporting of racial discrimination, both higher and lower levels of education can influence the frequency and perception of racial discrimination, due to the complex interplay of privileged and marginalized social statuses across different context (Gaston et al., 2023).

Greater reports of experiencing major lifetime discriminatory events were associated with membership in both the "moderate" and "persistently high and increasing" trajectory groups in comparison to the low-stable trajectory group. We observed consistency in this relationship across specific domains of major lifetime discrimination (i.e., unfairly treated or abused by police, denied a bank loan), with higher magnitudes exhibited in the "persistently high and increasing" trajectory group. This is logical because reporting differential treatment that results from the systematic exclusion of individuals from accessing educational, employment, and legal systems (Kaur et al., 2024), helps to provide a rudimentary context of exposure to structural discrimination during one's life course and across the trajectory groups. Thus, it is not surprising that individuals who report more major lifetime discrimination are more likely to be members of the more burdened racial discrimination trajectory group. Importantly, these findings illustrate the impact of major lifetime discrimination in characterizing heterogeneity across the trajectory groups.

Higher levels of neighborhood social cohesion were associated with membership in both the "moderate" and "persistently high and increasing" trajectory groups compared to the "low-stable" trajectory group. This finding may seem counterintuitive, but it aligns with existing research suggesting that strong neighborhood social cohesion can facilitate a sense of community and belonging, which may support coping strategies to buffer and mitigate the adverse impact of racial discrimination (Hailu et al., 2021). For example, individuals in socially

cohesive neighborhoods often have access to community resources and social networks that can help to process, manage, and respond to discriminatory experiences, such as collective action, reappraisal, and framing discrimination as a shared experience. However, our measure of racial discrimination does not specify the location where discrimination occurs, nor does it distinguish between experiences within or outside one's neighborhood context. It is possible that individuals who reside in cohesive neighborhoods may still face discrimination in other environments such as the workplace. Moreover, including objective measures of neighborhood context, such as neighborhood socioeconomic status, could further illuminate how structural factors interact with social cohesion to influence individuals' cumulative experiences of racial discrimination. Ultimately, resilience resources, including strong community ties, are crucial for understanding how Black adults navigate and respond to racial discrimination. These resources could offer valuable insights for future research on the long-term patterning of racial discrimination and resilience.

Individuals reporting greater levels of psychological resilience and more positive social support were less likely to be in the "moderate" and "persistently high and increasing" trajectory groups. This suggest that greater psychological resilience and social support may play a protective role in mitigating the experience of racial discrimination over time. These findings are in alignment with prior research indicating that resilience and strong social support networks help individual better cope with experiencing racial discrimination (Thomas Tobin, Erving and Barve, 2021; Turner, 2009). However, we did not see an association between general social participation and membership in racial discrimination trajectory groups. This suggests that the type or quality of social participation may be more important than simply the quantity of participation. It is also possible that different forms of social engagement (e.g., participation in religious activities, participation in activism versus leisure activities) could differentially impact on how individuals perceive or respond to discrimination. Some scholars have questioned whether conventional definitions and theoretical approaches to operationalize and measure resilience adequately capture race- and culturally-specific experiences (Sims-Schouten and Gilbert, 2022; Woods-Giscombe et al., 2023). For example, Sims-Schouten and Gilbert (2022) assert that resilience may additionally encompass resistance to the effects of differential treatment due to race, emphasizing the importance of agency and centering one's identity (Sims-Schouten and Gilbert, 2022). For Black adults, psychological resilience might be conceptualized as heightened vigilance – an acute awareness of and responsiveness to racial discrimination as a strategy to avoid harmful situations when navigating discriminatory experiences (Mekawi et al., 2021). A more comprehensive theoretical conceptualization of resilience could better capture race- and culturally-specific resilience strategies - such as processing, recognizing and responding to racism – and shed light on how individuals navigate and adapt to experiences of racial discrimination. These considerations highlight the need for further exploration into novel resilience measures that can help explain the differential patterns of racial discrimination.

Strengths of the present study include the repeated measurement of racial discrimination, which provides a rare opportunity to identify the distinct long-term trajectories of racial discrimination in a nationally representative sample of midlife and older Black adults over 12 years. The HRS is one of the only datasets to consistently measure and capture racial discrimination over time. Additionally, we were able to take a multidimensional approach and explore whether resilience resources at the individual- and neighborhood-level were associated with the trajectory profiles. However, our findings study should be interpreted considering several limitations. First, measurement errors could have occurred in the operationalization of the racial discrimination trajectories. While data from the HRS is collected prospectively, respondents were queried on the questions about racial discrimination retrospectively. Although the HRS includes repeated measures of discrimination, the question wording does not explicitly provide a specific time frame to

recall the unfair treatment, and it is assumed that responses refer to the time frame since the last time the question was asked of the study participants. The HRS questions do not inquire about one's experiences of discrimination during other periods of one's life course. Additionally, sum scores were used to calculate the EDS. Prior research indicates that the choice of scale coding can influence exposure classification (Michaels et al., 2019). A comparison of sum and mean EDS scores across trajectory groups revealed no significant differences in the relative ranking of individuals between the two methods (see Supplemental Table 4). This suggests that the use of sum scores did not result in substantial misclassification. Second, we focused on discrimination in a single domain – race – and did not capture other attributes (e.g., age, gender, religion, socioeconomic status) by which the study participants may additionally experience discrimination. We focused on racial discrimination since it is one of the most common forms of discrimination experienced among Black adults (Bleich et al., 2019). Third, given the sample size of our study population, analyses stratified by gender were not conducted due to a concern of sufficient power. Also, our sample size was significantly reduced because many respondents only had one measure of racial discrimination across the 4 waves (see Supplemental Table 2). The lack of complete data, particularly among men and individuals with lower levels of education may introduce bias that affect the trajectory group classifications. These demographic factors could limit the generalizability of our findings and may influence the study's overall conclusions. Given that the distribution of individuals across trajectory group may vary by sample population, further research using a larger sample is needed to replicate the trajectories, confirm their stability and generalizability, as well as adequately explore gender and cohort differences with sufficient statistical power. Fourth, our analyses do not account for the duration and changes in resilience resources over time. Relatedly, we were limited to the type and scope of resilience resources that were collected in the HRS, which may not be inclusive of resilience resources that may help Black adults cope and navigate racial trauma (Sims-Schouten and Gilbert, 2022). Lastly, our analyses did not account for factors such as personality characteristics (e.g., neuroticism and negative affect) and perception biases (e.g., vigilance, where individuals perceives more discrimination than actually exists or minimization, where individuals perceives less discrimination than actually exists) (Kaiser and Major, 2006). Prior research suggests that these factors can influence and individual's motivation, willingness, and tendency to perceive and report discrimination (T. T. Lewis et al., 2015). Such factors may pose a threat to the validity of racial discrimination measures (T. T. Lewis et al., 2015). Additional research may be needed to explore and disentangle the full range of characteristics that shape how individuals perceive and report racial discrimination.

5. Conclusion

We identified three distinct racial discrimination trajectories and resilience resources associated with trajectory group membership. These findings demonstrate the significance of considering the cumulative experiences of racial discrimination over time in a sample of midlife and older Black adults. Refining the measurement of racial discrimination in the aging process can extend our understanding of the complex processes and mechanisms to more precisely elucidate pathways and generate new hypotheses linking cumulative experiences of racial stress and healthy aging. Future empirical work is necessary to investigate if membership in a specific racial discrimination trajectory group confers differential health risk and can help to explain variability in aging-related health outcomes.

CRediT authorship contribution statement

Kellee White Whilby: Writing – review & editing, Writing – original draft, Supervision, Methodology, Funding acquisition, Conceptualization. **Shuo J. Huang:** Writing – review & editing, Formal analysis.

Bethany A. Bell: Writing – review & editing, Methodology, Formal analysis. **Kaitlynn Robinson-Ector:** Writing – review & editing, Formal analysis. **Mario Sims:** Writing – review & editing. **David R. Williams:** Writing – review & editing.

Ethical statement and consent

All participants provided informed consent, and the study was approved by the University of Michigan Institutional Review Board. The secondary data analysis was deemed as exempt human subjects research by the University of Maryland College Park Institutional Review Board.

Declaration of competing interest

The authors declare no competing interests.

Acknowledgments

Not applicable.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2025.118194.

Data availability

Data will be made available on request.

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